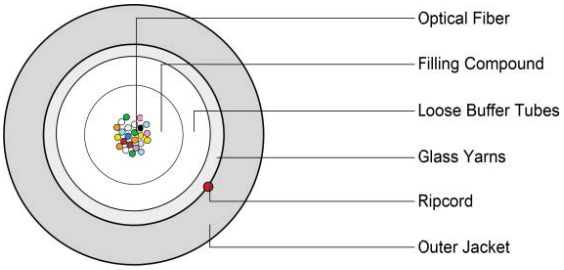
# Fiber Optics

## 24F Loosetube Non-Armored Cable

PPC A BELDEN BRAND

## Features and Benefits

- Fiber-count 2-24 fibers
- Central loose-tube design
- Lightweight construction
- Plenum (OFNP / FT6), LSZH, Riser OFNR (FT-4-ST1)
- OS2, OM3 and OM4 performance types
- Color-coded fibers for easy identification
- Compact design for limited conduit space
- Limited Rodent resistant



24-Fiber Cable

## Overview

PPC single jacket non-armored central loose tube cable is a UV-stabilized, fully water blocked cable for outdoor duct applications (PE outer jacket) or Indoor/Outdoor applications (LSZH outer jacket). The loose tube design provides stable and highly reliable transmission parameters for a variety of voice, data, video and imaging applications.

This lightweight cable offers durability and flexibility required for many outside plant applications. Its compact design is suitable for limited conduit space and the cables are well suited for campus-type environments in and between buildings without building entry joints.

The fiber cable contains 2 to 24 fibers individually coated with 250µm layer and color coded as per Telcordia requirements. The optical fibers are contained inside a central loose tube with thixotropic gel to prevent water penetration and protect the fibers against shock. The central loose tube is surrounded by glass yarn, water swell-able yarn, rip cord and a PE or LSZH jacket. The glass yarn layer provides tensile strength and offers limited rodent protection.

The fiber optic central loose tube cable is RoHS compliant and exceeds all the requirements as per the industry standards.

## Application

- Building Interconnections (Campus LAN)
- FTTx & Telecommunications Networks
- Cable TV and security applications
- Telemetry applications

## Standards

- ITU.T G.652D / G.657A/B / G.651.1
- ANSI/TIA-568-C.3 / ISO/IEC 11801
- IEC 60793 / IEC 60794
- IEC 60332-1-2, IEC 60332-3-24, IEC 60754-1,2 & IEC 61034-2

## Technical Data

### Optical Characteristics: Singlemode - 9µmOS2-G.652D, G.657A/B

| Fiber Type | Unit | OS2 G.652D | | G.655D | | G.657A | |
|---|---|---|---|---|---|---|---|
| Wavelength | nm | 1310 | 1550 | 1310 | 1550 | 1310 | 1550 |
| Attenuation | dB/km | ≤ 0.35 | ≤ 0.21 | ≤ 0.35 | ≤ 0.21 | ≤ 0.35 | ≤ 0.21 |
| Chromatic dispersion | Ps/nm.km | ≤ 3.5 | ≤ 18 | ≤ 3.5 | ≤ 18 | ≤ 3.5 | ≤ 18 |
| Zero dispersion wavelength | nm | 1300 ~ 1324 | | 1300 ~ 1324 | | 1300 ~ 1324 | |
| Zero dispersion slope | ps/nm2. km | ≤ 0.092 | | ≤ 0.092 | | ≤ 0.092 | |
| PMD | ps/√km | ≤ 0.2 | | ≤ 0.2 | | ≤ 0.2 | |

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| Fiber Type | | Unit | OS2 G.652D | | G.655D | | G.657A | |
|---|---|---|---|---|---|---|---|---|
| Cut-off wavelength | | nm | ≤ 1260 | | ≤ 1260 | | ≤ 1260 | |
| Mode-field diameter | | µm | 9.2 ± 0.4 | 10.4 ± 0.5 | 8.6 ± 0.4 | 10.4 ± 0.5 | 8.6 ± 0.4 | 10.4 ± 0.5 |
| Macro Bend Loss | 30mm radius x 100 turns | dB | - | ≤0.05 | - | - | - | - |
| | 15mm radius x 10 turns | | - | - | - | ≤0.25 (A1)<br>≤0.03 (A2) | - | ≤0.03(B2)<br>≤0.03 (B3) |
| | 10mm radius x 1 turns | | - | - | - | ≤0.75 (A1)<br>≤0.1 (A2) | - | ≤0.1 (B2)<br>≤0.08 (B3) |
| | 7.5mm radius x 1 turns | | - | - | - | ≤0.5(A2) | - | ≤0.5 (B2)<br>≤0.15 (B3) |
| Core/Clad Concentricity Error | | µm | ≤ 0.8 | | ≤ 0.6 | | ≤ 0.6 | |
| Cladding Diameter | | µm | 125 ± 1 | | 125 ± 1 | | 125 ± 1 | |
| Cladding Non- circularity | | % | ≤ 1.0 | | ≤ 1.0 | | ≤ 1.0 | |
| Coating Diameter | | % | 245 ± 15 | | 245 ± 15 | | 245 ± 15 | |
| Proof Test Level | | Kpsi | ≥ 100 | | ≥ 100 | | ≥ 100 | |
| Fiber curl | | m | ≥ 4 | | ≥ 4 | | ≥ 4 | |

**Optical Characteristics: Multimode - 62.5 µm (OM1), 50µm (OM2, OM3, OM4)**

| Fiber Type | | OM1 | | 0M2 | | 0M3 | | 0M4 | |
|---|---|---|---|---|---|---|---|---|---|
| Wavelength | nm | 850 | 1300 | 850 | 1300 | 850 | 1300 | 850 | 1300 |
| Attenuation | dB/km | ≤ 3.5 | ≤ 1.0 | ≤ 3.0 | ≤ 1.0 | ≤ 3.0 | ≤ 1.0 | ≤ 3.0 | ≤ 1.0 |
| Over filled Launch Bandwidth (LED based sources) | MHz.k m | ≤ 200 | ≤ 500 | ≤ 500 | ≤ 500 | ≤ 1500 | ≤ 500 | ≤ 3500 | ≤ 500 |
| Effective Modal Bandwidth (850 nm Laser based sources) | MHz.k m | - | | - | | ≤ 2000 | | ≤ 4700 | |
| Numerical aperture | - | 0.275 ± 0.015 | | 0.20 ± 0.015 | | 0.20 ± 0.015 | | 0.20 ± 0.015 | |
| Core diameter | µm | 62.5 ± 3.0 | | 50 ± 3.0 | | 50 ± 3.0 | | 50 ± 3.0 | |
| Core Non-Circularity | % | ≤ 6.0 | | ≤ 6.0 | | ≤ 6.0 | | ≤ 6.0 | |
| Cladding diameter | µm | 125 ± 2.0 | | 125 ± 2.0 | | 125 ± 2.0 | | 125 ± 2.0 | |
| Cladding Non- Circularity | % | ≤ 2.0 | | ≤ 2.0 | | ≤ 2.0 | | ≤ 2.0 | |
| Core / Cladding Concen-tricity Error | µm | ≤ 3.0 | | ≤ 3.0 | | ≤ 3.0 | | ≤ 3.0 | |
| Coating diameter | µm | 245 ± 5.0 | | 245 ± 5.0 | | 245 ± 5.0 | | 245 ± 5.0 | |
| Proof test level | Kpsi | ≤ 100 | | ≤ 100 | | ≤ 100 | | ≤ 100 | |

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## 24F Loosetube Non-Armored Cable

### Environmental Data

| Temperature range | Value |
|---|---|
| Storage | - 10°C to +70°C |
| Service | - 10°C to +70°C |
| Installation | - 10°C to +60°C |

### Mechanical Data

| Description | Standards | Value |
|---|---|---|
| Tensile Load / Strength | IEC 60794-1-2-E1 | 1600N |
| Crush Resistance | IEC 60794-1-2-E3 | 1100N/cm |
| Impact Resistance | IEC 60794-1-2-E4 | 1 impacts @ 3 points, 15Nm /25J |
| Torsion Test | IEC 60794-1-2-E7 | ± 180°, ± 1 turn/2m |
| Cable Bend | IEC 60794-1-2-E11 | 20 D for 4 turns, 10 Cycles |
| Drip test | IEC-60794-1-E14 | 30 cm, 70°C, 24 hour |
| Temperature Cycling | IEC 60794-1-2-F1 | 23°C → -10°C → 70°C |
| Water penetration | IEC 60794-1-2-F5 | 1 meter head, 3 meter / 24 hours |

### Physical Data

| No. of fibers | *Cable diameter PE/LSZH | Nominal weight | Maximum tensile load | | Crush load | | Min. bend radius | |
|---|---|---|---|---|---|---|---|---|
| | | | Short term | Long term | Short term | Long term | Loaded | Installed |
| | mm | Kg/Km | N | N | N/cm | N/cm | mm | mm |
| 2 | 7.4 | 50/65 | 1600 | 550 | 110 | 55 | 148 | 74 |
| 4 | 7.4 | 50/65 | 1600 | 550 | 110 | 55 | 148 | 74 |
| 6 | 7.4 | 50/65 | 1600 | 550 | 110 | 55 | 148 | 74 |
| 8 | 7.4 | 50/65 | 1600 | 550 | 110 | 55 | 148 | 74 |
| 12 | 7.4 | 50/65 | 1600 | 550 | 110 | 55 | 148 | 74 |
| 16 | 7.4 | 50/65 | 1600 | 550 | 110 | 55 | 148 | 74 |
| 18 | 7.4 | 50/65 | 1600 | 550 | 110 | 55 | 148 | 74 |
| 24 | 7.4 | 50/65 | 1600 | 550 | 110 | 55 | 148 | 74 |

* Denotes nominal value for PE / LSZH Jacketed Cable

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### Transmission Performance

| Application | OS1/OS2 Singlemode (1310/1383/1550) | OM1 Multimode (850/1300) | OM2 Multimode (850/1300) | OM3 Multimode (850/1300) | OM4 Multimode (850/1300) |
|---|---|---|---|---|---|
| 100Base-FX, Ethernet, @ 1300nm | - | 2000m | 2000m | 2000m | 2000m |
| 100Base-LX, @ 1310nm | 10000m | - | - | - | - |
| 1000Base-SX, Gigabit, Ethernet @ 850nm | - | 275m | 550m | 550m | 550m |
| 100Base-LX, Gigabit Ethernet, @ 1310nm | 1000m | 550m | 550m | 550m | 550m |
| 10GBase-SR, 10Gbps @ 850nm | - | 33m | 82m | 300m | 550m |
| 10GBase-LR, 10Gbps @ 1310nm | 1000m | - | - | - | - |
| 40GBase-SR, 40Gbps @ 850nm | - | - | - | 100m | 150m |
| 40GBase-LR4, 40Gbps @ 1310nm | 1000m | - | - | - | - |
| 100GBase-SR10, 100Gbps @ 850nm | - | - | - | 100m | 150m |
| 100Base-LR4, 100Gbps, @ 1310nm | 1000m | | | | |
| 100Base-ER4, 100Gbps, @ 1550nm | 30000m | - | - | - | - |

## Cable Construction

| Construction of single unit cables | | |
|---|---|---|
| **Description** | | **Value** |
| Number of fibers | | Max. 24 |
| Filling Compound in Loose Buffer Tube | | Singlemode – 9/125 µm (OS2 G.652D), G.657A1/A2, B1, B2<br>Multimode – 62.5/125 µm (OM1), 50/125 µm (OM2, OM3, OM4) |
| Loose buffer tube | | PBT (Polybutylene Terephthalate) 4.0 mm Ø |
| Strength Member | | Glass yarn |
| Water blocking material | | Water swell-able yarns |
| Outer Jacket Material | Material | UV Black HDPE/LSZH |
| | Thickness | Nominal 1.0mm |

## Color of Fiber Buffer

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Blue | Orange | Green | Brown | Grey | White | Red | Black | Yellow | Violet | Pink | Aqua |

| 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Blue | Orange | Green | Brown | Grey | White | Red | Black | Yellow | Violet | Pink | Aqua |

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## Ordering Information

FC ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

3 | 4-6 | 7-8 | 9-11 | 12

**03.** Fiber Type
- 1 = OM1
- 2 = OM2
- 3 = OM3
- 4 = OM4
- 5 = OM5
- S = G.652D
- A = G.657A1- BIF 10mm
- N = G.657A2- BIF 7.5mm
- B = G.657B3- BIF 5mm
- G = G.655

**04-06.** Cable Type
- CLT = Central Loose Tube

**07-08.** Cable Type
- GA = Glass Yarn

**09-11.** Fiber Count
- 004 = 4F
- 006 = 6F
- 008 = 8F
- 016 = 16F
- 024 = 24F

**12.** Jacket Material
- L = LSZH
- R = Riser
- E = PE
- P = Plenum

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